rachna program
2001-2006

women and child health at scale

working paper series

paper5

widening coverage of micronutrient supplements

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Widening Coverage of Micronutrient Supplements

Abstract

Background and Interventions

INHP-II promoted a set of strategies to improve the coverage of micronutrient supplements to women and children, as part of an integrated package of interventions to reduce malnutrition and mortality among children. Primarily, these strategies focused on helping the ICDS program and the programs of the Health Department give due priority to vitamin A and iron supplementation, improve mechanisms of tracking individual women and children, and improve supervision of these mechanisms. All interventions were implemented at the full project scale of 78 districts across nine states. This paper describes the results and lessons from this experience.

Methods

Evidence is drawn mainly from state-level estimates of indicators from program baseline and endline surveys, district-level estimates from three rounds of periodic assessments from one district in each of the eight project states and from an evaluation research study conducted in one district to assess the impact of the INHP interventions on nutritional status, which included two intervention and two comparison districts. All estimates presented in the results pertain to INHP-assisted regions within the respective states and districts.

Results and Discussion

Vitamin A supplementation: In all the seven states for which data was available, the prevalence of reported night-blindness in pregnancy was estimated at greater than five percent, confirming that vitamin A deficiency was a public health concern across all program states. Over the life of the program, the proportion of children 12–23 months old who received the first dose of vitamin A increased 26 percentage points to reach about 61 percent, with increases of 15 percentage points or more in seven of the eight states. Two-dose coverage among children 18-23 months old increased 16.5 percentage points, reaching about 26 percent. Third dose coverage among children 21-23 months old was estimated to be about 12 percent at the program level, but sample size limitations preclude generation of state level estimates. Factors that may have contributed to increased coverage include the emphasis on the importance of vitamin A during training, available tracking systems and the policy and program environment provided by the biannual months' strategy. Limited improvement in two-dose coverage is a matter of concern. Evidence suggests that the biannua ...did contribute to increasing first dose coverage, but not the ...with service providers also suggests that, given current c... Kit A (which includes vitamin A bottles) to the field do n... ...ble supplies that is limiting coverage. Stronger emphasis ...n are probably the way forward.

Iron Supplementation: The delivery of 90 or ... ...cribed in the national programs, increased 25 percenta... ...e of the project, reaching 45 percent or greater covera... ...ant women

...e back cover)

A. Widening Coverage of Vitamin A Supplements

Background

Vitamin A deficiency is a major public health problem in many developing countries including India. India has the largest percentage as well as the largest absolute number of vitamin A deficient children in the world. It is estimated that 57 percent of children under six years of age are at a potential danger from sub-clinical vitamin A deficiency (WHO, 1995).

WHO defines vitamin A deficiency as tissue concentrations of vitamin A low enough to have adverse health consequences even if there is no evidence of clinical xerophthalmia. According to current understanding, vitamin A is necessary, along with other micronutrients, in several critical cellular processes in the body, and these processes are impaired before the effects of deficiency on the eye and the visual cycle become clinically apparent. Such impairment leads to increased severity of certain infections such as diarrhea and measles, and an increased risk of death (WHO, 2004). The Lancet child survival series (2003) estimated that making vitamin A supplementation universal in reach from current average global coverage can contribute two percent to the expected two-thirds reduction in child deaths if all currently known effective interventions were simultaneously taken to near-universal coverage.

Various indices have been defined, with population prevalence cut-offs that identify a community or population where vitamin A deficiency is a public health concern. Traditionally, clinical signs and symptoms of xerophthalmia, sometimes supported by evidence of deficient blood values and dietary intakes of the vitamin have been used, but have limitations. Of late, the prevalence of maternal night blindness has been postulated as a useful and reliable indicator of the vitamin A status of the community (IVACG, 2002).

India has long recognized vitamin A deficiency as the leading cause of preventable blindness in children and was the first country to start using large dose vitamin A supplementation at scale, starting with selected states in 1970. It recognizes vitamin A supplementation as one of the key interventions in its effort to achieve MDG four targets. Evaluations of the program, through assessments of prevalence of vitamin A deficiency, showed a large decline through the nineties, but the prevalence remained above the levels considered acceptable. By national policy, at least five massive doses are offered to children 6-35 months old: The first dose of 100,000 IU with measles vaccination at nine months and subsequent four doses of 200,000 IU each, every six months.[1] It also provides for one dose of vitamin A on measles identification, if the child has not received vitamin A during the previous month (Tenth Five Year Plan, 2002 to 2007, GoI). Most states at different points in time have switched to providing the latter four doses as a part of a biannual strategy, each of the six monthly campaigns lasting about a month to provide greater focus to critical maternal and child nutrition and health interventions, including vitamin A supplementation.

[1] In November 2006 GOI issued a notification stating that the first dose of 100,000 IU will be administered, as earlier, between 6 to 11 months, but has increased the age range of the remaining doses to 1 to 5 years, when one dose of 200,000 IU will be administered every six months. In essence a child must receive a total of 9 doses by its fifth birthday. This policy modification however has no bearing on the results being discussed in this communication.

The INHP project of the RACHNA program supports both, the routine and the biannual strategies, and in partnership with state governments, MOST/A2Z project, UNICEF, and WHO, attempts to help ICDS and RCH programs find and plug operational gaps in reaching higher coverage. INHP is an integrated approach that includes support to newborn care, nutrition and immunization. Specific areas of support to the vitamin A supplementation programs include:

- Training inputs to AWW and ANM and their supervisors emphasizing the importance of vitamin A to child health and survival. Similar inputs at block/ PHC and district levels to help make vitamin A supplementation a priority.
- Helping strengthen recording and tracking systems, including modifying service registers to include five columns for as many doses of vitamin A between six and 35 months, and using due lists to identify children due for vaccines. In states using the biannual months strategy, the emphasis is on including all children in the fresh lists drawn up for administration of vitamin A.
- Helping improve coordination between AWW and ANM to maximize coverage.
- Identifying supply chain gaps at PHC and lower levels, and helping the systems rectify them through local advocacy efforts.

This paper describes the results achieved and lessons learnt around improving coverage of children with vitamin A supplementation.

Methods of Assessment

Evidence used in this paper comes mainly from a number of large sample surveys conducted over the life of the program for monitoring and evaluation purposes. This section describes the methodology of these surveys in brief.

Baseline and Endline surveys

Baseline and endline surveys of INHP-II provided state-level estimates for selected indicators. The endline survey of INHP-I (early 2001) served as the baseline survey of INHP-II. The INHP-I endline for Bihar served as the baseline for Jharkhand and the Madhya Pradesh endline served as the baseline for both Madhya Pradesh and Chhattisgarh, since the new states of Chhattisgarh and Jharkhand were created from a division of the erstwhile Madhya Pradesh and Bihar respectively, just prior to the INHP-endline survey.

INHP-I consisted of three kinds of program areas based on intensity of interventions and effort: the "High impact" blocks, "Capacity building blocks" and "Other blocks". The 2001 survey was designed to generate separate estimates of these three areas through a multi-stage sampling design: a fixed number of blocks and PSUs (AWCs) were randomly picked from each of the three areas 540, 540 and 832 respondents (mothers of children 0-23 months old) were selected respectively using a predetermined random selection process. The interview tool was common to all children 0-23 months, and covered all interventions supported by INHP – antenatal, natal and newborn care, infant feeding and immunization. State-level estimates, derived by applying population weights to the three areas, are used for all comparisons with the endline, without reference to the three kinds of program areas.

The endline survey of INHP-II (early 2006) used a multistage sampling design, but this differed in some respects from the baseline. The respondents (mothers of children 0-23 month old), were drawn from two groups. The mothers of children 0-5 months of age were asked questions related mainly to antenatal, natal and newborn care and breastfeeding (and night blindness during pregnancy), while mothers of children 6-23 months old were interviewed with questions mainly related to complementary feeding and immunization, as well as vitamin A supplementation. This helped minimize recall bias and capture more recent events, likely to have been influenced by program interventions. The sample size was sufficient to detect a 10 percentage point difference in an estimate with 95 percent confidence levels and 80 percent power, with an assumed maximum design effect of 1.8. Sampling frames were generated for children 0-5 months and 6-23 months by prior house-listing and the target sample picked by circular systematic sampling, making allowance for a non-response rate of 15 percent. For each group, the target number to be completely interviewed was 733. Effectively, this sampling method resulted in a virtually self-weighted sample for each state.

Periodic Rapid Assessments (RAPs) in the panel districts

In order to monitor progress in outcomes to inform program strategies, a panel of one district from each of the eight states was established in 2003, where three rounds of periodic assessments were conducted between 2003 and 2005 at approximately annual intervals. The universe for these assessments was the first phase replication sites (the first batch of 25 percent AWCs in the district where at-scale implementation began).

Mothers of children 0-5 months of age were asked question mainly related to antenatal, natal and newborn care and breastfeeding, while mothers of children 6-23 months old were asked question mainly related to complementary feeding and immunization. Round 1 had a two-stage design, first randomly selecting five blocks from each district, and then five PSUs from each block, followed by selecting a fixed number of 0-23 months old from each PSU, whose mothers were respondents. The target sample size was 150 for children 0-5 months old and 450 for children 6-23 months old. Rounds 2 and 3 used a one-stage design, randomly picking 90 PSUs from the universe, spread across all blocks in the district, and then randomly selecting the target sample (460 each for the two age groups 0-5 and 6-23 months) from a sampling frame generated by house-listing after allowing for a 15 percent non-response. The latter samples were sufficient to detect a difference of 10 percentage points in estimates of two surveys with 95 percent significance and 80 percent power, assuming a small design effect. The estimates from the first round were therefore expected to be less precise than those for the subsequent rounds, particularly for the smaller sample of the 0-5 month group. The tools used in Round 1 were modified to add more questions and refine existing ones, while ensuring maximum comparability.

The Nutrition Evaluation Research

The nutrition evaluation research study was conducted by the Johns Hopkins Bloomberg School of Public Health to assess the impact of the INHP intervention package on the nutritional status of children 0-23 months old, when implemented at scale. The study lasted two years. It was located in two program districts – Barabanki in Uttar Pradesh and Karimnagar in Andhra Pradesh, using ICDS covered areas in Unnao in Uttar Pradesh and Rangareddy in Andhra Pradesh as non-intervention

comparison respectively. The study used a quasi-experimental pre-post design with multi-stage sampling. The baseline survey was conducted in 2003 and the endline survey was contemporaneous with the RACHNA program endline survey in early 2006. Two smaller "adequacy" surveys were conducted at intervals between the baseline and endline surveys. Sample sizes at the baseline and endline surveys were designed to be adequate to detect a difference of 0.18 in z scores of nutritional status.

More detail of these surveys and related methodological information is available from the paper, *Methods Used for Assessments in the RACHNA Program*, in this series.

In tabulating and presenting results, estimates of indicators are presented separately for each district or state as the case may be, and in most cases, the average program-wide estimates are not emphasized. This pattern has been followed to retain the focus on individual states and districts, among which there is considerable variability.

Also, statistical significance tests are not presented for most primary results, such as when comparing estimates for indicators across baseline and endline surveys, or across rounds of RAPs. Most of the surveys were large sample surveys, designed to detect differences of 10 percentage points or more between two comparable rounds. While confidence intervals or p values could have been presented, this would have made the already large tables, each bearing results from eight states or districts, even less user-friendly. Instead, the authors have taken the view that it is safe to assume that a difference of 10 percentage points or more between rounds is likely to be statistically significant in most cases, and that showing statistical significance for differences of less than 10 percentage points may not be convincing from a program perspective. Thus, descriptions of results also generally distinguish between differences of 10 percentage points or more (as being statistically significant and programmatically relevant in most cases), and lesser differences (as being not convincing in most cases). While this approach oversimplifies the presentation of results, it should help the general reader interpret results more easily. More experienced and interested readers will look deeper, in any case.

Results and Discussion

The Prevalence of Vitamin A Deficiency

Questions were asked to respondents (mothers of children 0-5 months) about whether or not they had experienced night blindness during their recent pregnancy. The proportion of women reporting night blindness at the program endline survey is shown in Table 5.1. Data from Andhra Pradesh for this indicator are not available since the questions were inadvertently missed during translation of tools. In the remaining states, the prevalence ranges from about six percent

Table 5.1: **Prevalence of night blindness during recent pregnancy, Endline (2006)**

	Chhattis-garh	Jharkhand	Madhya Pradesh	Orissa	Rajasthan	Uttar Pradesh	West Bengal	All
Mothers of 0-5 month olds	*686*	*590*	*614*	*690*	*623*	*614*	*634*	*4451*
% reporting night blindness during pregnancy	10.2	12.7	11.9	25.2	6.4	16.8	14.2	14.1

in Rajasthan to about 25 percent in Orissa. When maternal night blindness was recently mooted as a useful indicator, it was recommended that prevalence less than five percent should not be considered reliable due to possibility of false positives. Where populations show prevalence of maternal night blindness of more than five percent, this should be seen as a public health concern, deserving intervention (IVACG, 2002). By this criterion, each of the seven states for which data are available has a significant problem of vitamin A deficiency.

Vitamin A deficiency is known to show up in "clusters", with even village-to-village variability. It is not possible to disaggregate available data to village levels. However, wide variability can be seen at the district levels as well. For instance, in Orissa, where an average of 25 percent women reported having experienced night blindness during pregnancy, the variation across districts (subject to sampling limitations) is large – from less than 15 percent to 42 percent; in a small fraction of districts in the other states, the prevalence is zero or close to it (data not shown). It may not be a mere coincidence that the two states with the highest prevalence of maternal night blindness, Orissa and Uttar Pradesh, are also the states with some of the highest child mortality rates (NFHS-2, 1998).

Data is not available from these surveys for other indicators of vitamin A deficiency, such as night blindness prevalence or clinical signs in preschool children older than two years, since all RACHNA surveys were limited to children younger than two years. Data on night blindness was not collected in surveys previous to the program endline.

Vitamin A Coverage, and Change in Coverage Over Time

Information about the coverage of each of the first three doses of vitamin A was canvassed from the immunization card as well as mothers' recall during surveys, for children 6-23 months old at the time of the survey. Since the first dose is not normally administered before the age of nine months by policy, not more than three six-monthly doses can be administered by the age of two years. For easier interpretation, coverage for the first dose is estimated in children aged 12-23 months (average sample size about 430 per state in the endline survey), and coverage with two doses in children 18-23 months (average sample size about 190). Denominators are too small to estimate third dose coverage.

The coverage estimates for the first two doses at baseline and endline surveys are shown in Table 5.2. At program level, achieved first and second dose coverage estimates were about 61 percent and 26 percent respectively at the endline. By mothers' reports, about 12 percent of children in the 21+ month age group had received the third dose at the program level (not shown). Jharkhand, West Bengal, Andhra Pradesh and Orissa were the only states to achieve first dose coverage in excess of 70 percent, and only West Bengal, Andhra Pradesh, Orissa and Madhya Pradesh achieved greater than 20 percent two-dose coverage, with West Bengal at almost 50 percent. While these achievements are well below the universal coverage that was envisaged for the nearly four decades old vitamin A supplementation program, they do represent increases from the baseline in all states, with large increments in many of them. At the program level, coverage

Table 5.2: **Vitamin A coverage for 1st and 2nd doses (card or recall) Baseline-Endline (2001-2006)**

Indicator	Andhra Pradesh			Chhattisgarh			Jharkhand			Madhya Pradesh		
	BL	EL	Change	BL	EL	Change	BL	EL	Change	BL	EL	Change
Children 12-23 months	*351*	*470*		*371*	*414*		*443*	*437*		*371*	*409*	
Received at least one dose (%)	51.3	79.4	**28.1**	39.7	45.4	**5.7**	13.3	83.4	**70.1**	39.7	55.3	**15.6**
Children 18-23 months	*159*	*188*		*187*	*166*		*237*	*167*		*187*	*189*	
Received at least two dose (%)	7.5	43.1	**35.6**	11.7	19.3	**7.6**	5.7	18.6	**12.9**	11.7	24.3	**12.6**
Percentage drop-out from first to second dose	85.4	45.7	**-39.7**	70.5	57.5	**-13.0**	57.1	77.7	**20.6**	70.5	56.1	**-14.5**

BL = Baseline survey; EL = Endline survey; Change = Change from BL to EL; Andhra Pradesh (AP), Chhattisgarh (CG), Jharkhand (JH), Madhya Pradesh (MP), Orissa (OR), Rajasthan (RJ),

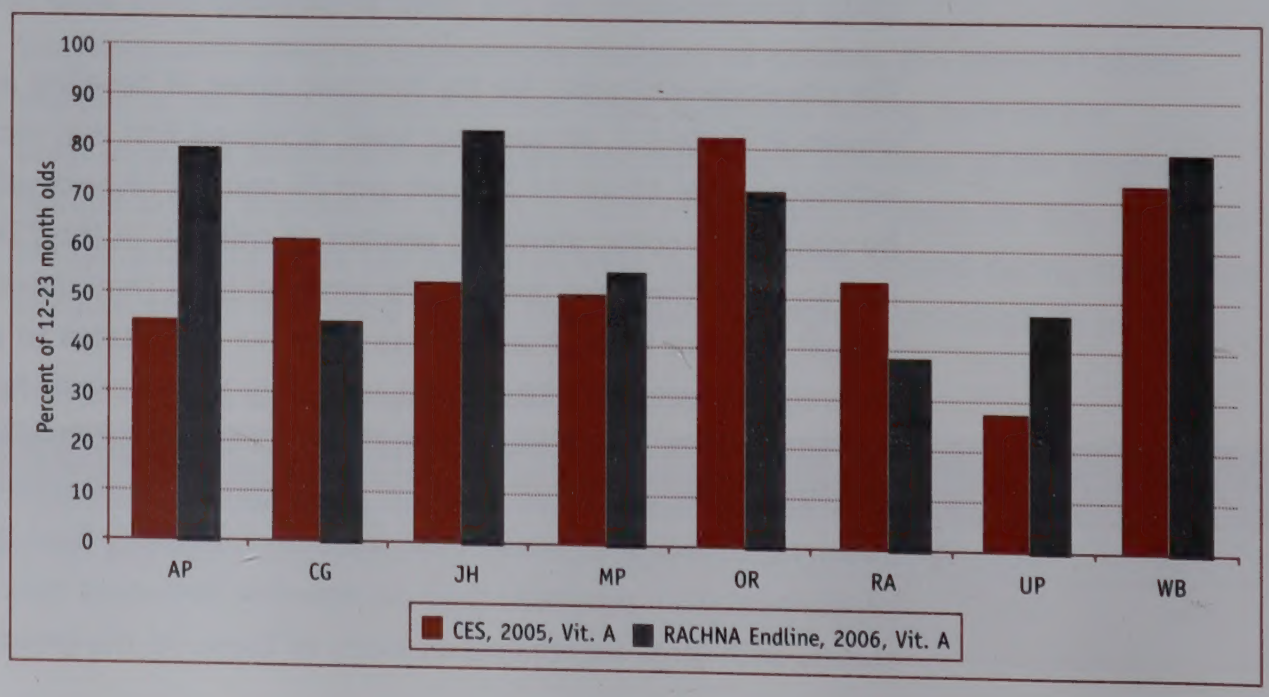
increased 26.5 percentage points from the baseline for the first dose, and 16.1 percentage points for two doses. Except for Chhattisgarh, all states showed increments in excess of 15 percentage points for the first dose, Jharkhand leading with a 70 percentage point increment to achieve 83 percent coverage. For two doses, only West Bengal, Andhra Pradesh and Orissa showed increments in excess of 25 percentage points. In Jharkhand, two-dose coverage was still a relatively low at 13 percent despite the large increase in first dose coverage.

The drop-out rates between the first and second doses for the baseline and endline are also shown in Table 5.2, expressed as a percentage of those who received the first dose. Drop out rates at the endline were still high in all states, with an average of almost 60 percent of those who got the first dose failing to get the second at the program level. However, except for two states (Jharkhand, where the increase in first dose was very large, and Uttar Pradesh), the drop out rates had declined about 15-40 percent by the endline.

Differences between RACHNA-served and Other Areas

Since the RACHNA surveys estimate vitamin A coverage by a method that is not directly comparable to the method used in NFHS surveys, it is difficult to compare the performance of RACHNA-assisted areas with those of other areas directly, as is possible for immunization coverage estimates. It is not possible to compare RACHNA baseline to endline increments in coverage with increments over successive surveys

Figure 5.1: **Vitamin A one dose coverage among children 12-23 months old: Comparison for RACHNA program states – CES 2005 and RACHNA Endline (2006).**



Orissa			Rajasthan			Uttar Pradesh			West Bengal			All		
BL	EL	Change	BL	EL	Change	BL	EL	Change	BL	EL	Change	BL	EL	Change
323	*428*		*376*	*450*		*328*	*466*		*348*	*474*		*2911*	*3502*	
34.9	72.1	**37.2**	21.5	39.0	**17.5**	21.7	48.4	**26.7**	52.0	79.3	**27.3**	34.6	61.1	**26.5**
164	*220*		*204*	*175*		*110*	*196*		*147*	*198*		*1395*	*1499*	
2.9	30.9	**28.0**	5.8	16.0	**10.2**	17.2	13.3	**-3.9**	15.1	49.5	**34.4**	9.4	25.5	**16.1**
91.7	57.1	**-34.5**	73.0	59.0	**-14.0**	20.7	72.5	**51.8**	71.0	37.6	**-33.4**	72.8	58.3	**-14.6**

Uttar Pradesh (UP), West Bengal (WB)

of NFHS because vitamin A coverage estimates of NFHS-2 and 3 appear to have been computed using methods that are not mutually comparable. Other large scale surveys that produce vitamin A coverage estimates are the Coverage Evaluation Surveys (CES) conducted by UNICEF. The estimates for one dose coverage from the 2005 round of CES are compared to estimates from the RACHNA endline in Figure 5.1. In three states, Andhra Pradesh, Jharkhand and Uttar Pradesh, coverage estimates from the RACHNA endline are much higher than estimates from CES. In two states, Chhattisgarh and Rajasthan, the state-wide CES estimates are higher, while in Orissa and West Bengal, the estimates from the two surveys are close.

Another set of data from non-RACHNA assisted areas comes from the non-intervention districts of the nutrition evaluation research studies. Table 5.3 presents the comparisons. In both the study sites (Andhra Pradesh and Uttar Pradesh), increments in one dose coverage were clearly larger in the intervention districts than in the control districts, particularly so in Uttar Pradesh, where the intervention district showed a large increase compared to an apparent decrease in the non-intervention district. Two-dose coverage data are not available from this study.

Factors Influencing Vitamin A Coverage

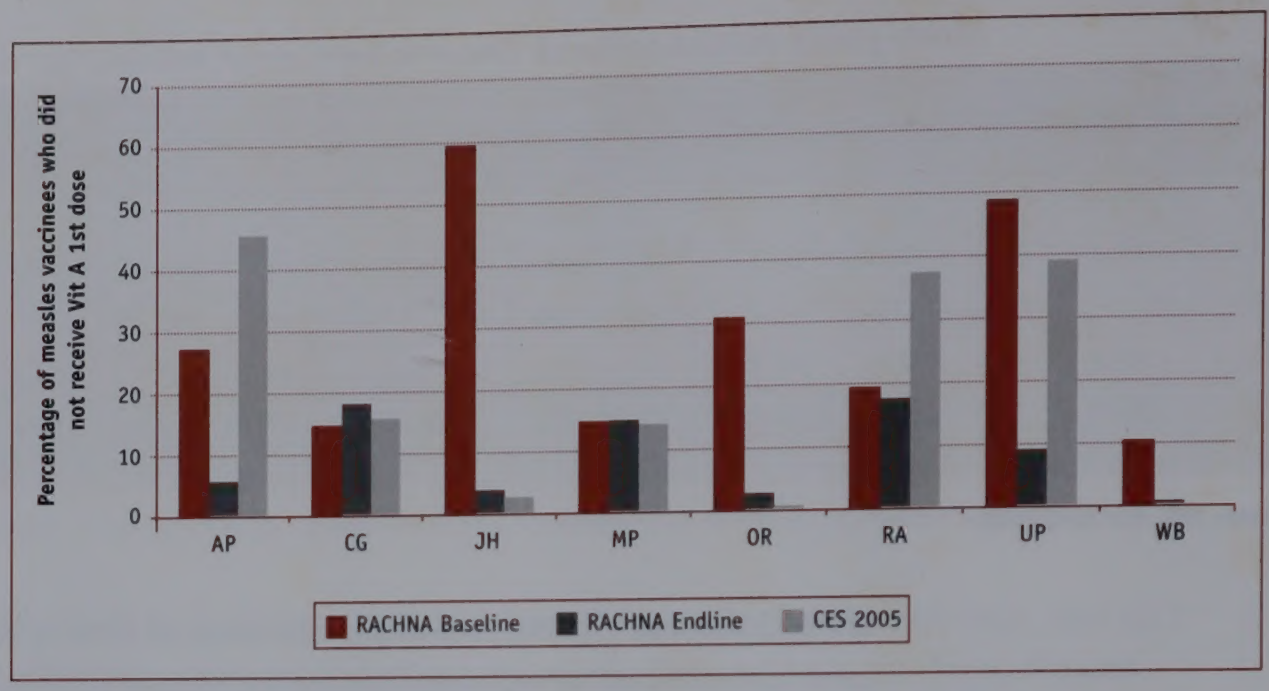
Measles vaccine and vitamin A first dose

Assessed by records on immunization cards from the endline survey, concordance between receipt of measles vaccine and the receipt of the first dose of vitamin A is very high: across states, almost 94 percent of those cards that had a record of the one having been administered also had a record of the other having been administered. By mothers' recall, the concordance was less perfect, with more than 20 percent of mothers who reported receiving measles vaccine failing to report

Table 5.3: **Comparison of one dose vitamin A coverage between intervention and non-intervention areas, Nutrition Evaluation Research sites, Baseline-Endline (2003-2006)**

Indicator	Andhra Pradesh							Uttar Pradesh						
	Intervention (Karimnagar)			Comparison (Rangareddy)			Diff. of change	Intervention (Barabanki)			Comparison (Rangareddy)			Diff. of change
	BL	EL	Change	BL	EL	Change		BL	EL	Change	BL	EL	Change	
Children 12-23 months	*1088*	*1199*		*1160*	*1100*			*1137*	*1178*		*1095*	*1087*		
Received at least 1 dose (%)	55.2	79.9	**24.7**	47.1	61.1	**14.0**	**10.7**	18.1	69.3	**51.2**	35.5	26.6	**-8.9**	**60.1**

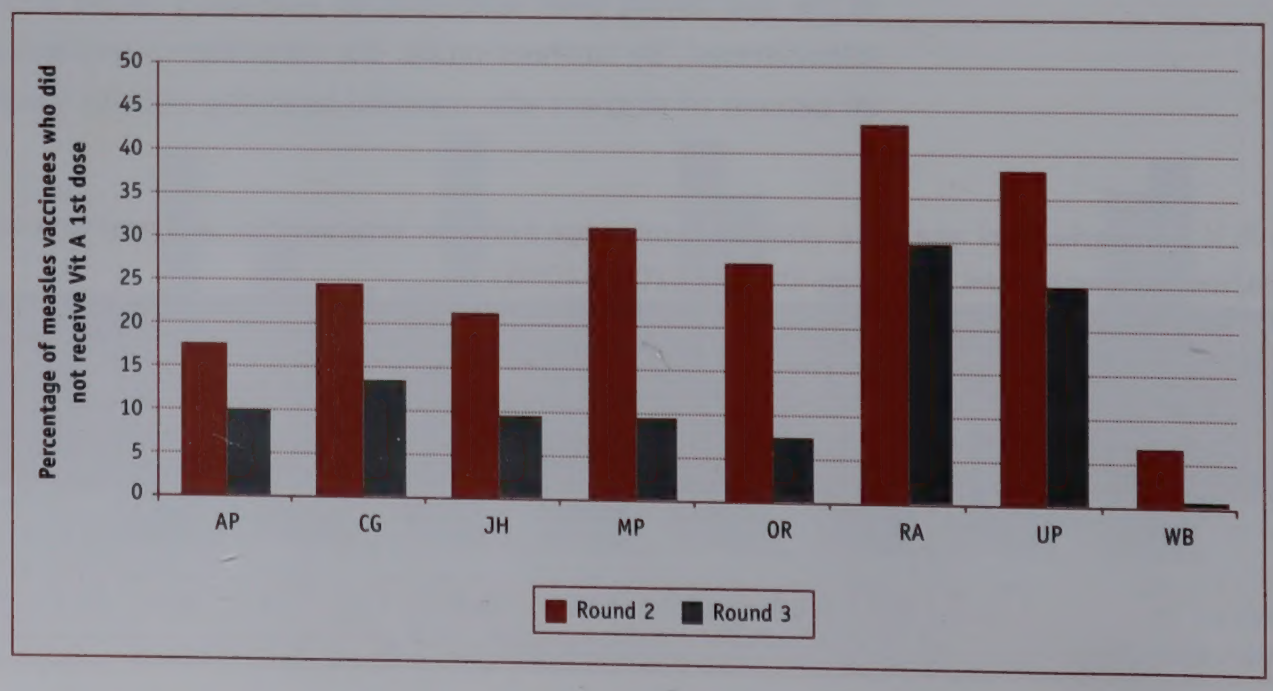
Figure 5.2: **Missed opportunities for vitamin A first dose - comparisons between RACHNA Baseline (2001), Endline (2006) and CES (2005).**



receipt of the first dose of vitamin A in Madhya Pradesh, Rajasthan, Chhattisgarh and Uttar Pradesh (data not shown). While this suggests that there are significant missed opportunities in ensuring coverage of the first dose along with measles vaccine in these states, it is also possible that some of the mothers whose children were administered vitamin A were unaware of what was being administered, and therefore failed to report this when interviewed. Figure 5.2 compares missed opportunities for vitamin A first dose administration – the difference between measles and vitamin A first dose coverage – between CES 2005 and the RACHNA baseline and endline survey estimates in RACHNA program states. There are two observations of interest here. In five of the eight states, the missed opportunities at the RACHNA baseline were 10 percent or more than at the endline. Secondly, the missed opportunities in non-RACHNA-assisted areas (CES, 2005) were much higher in three of the eight states, Andhra Pradesh, Rajasthan and Uttar Pradesh than in RACHNA-assisted areas at the endline. In every state, the RACHNA endline missed opportunities are among the lowest. This suggests that program efforts had a strong positive influence on coverage of the first dose of vitamin A.

Similar evidence is available from the panel districts, where similarly measured missed opportunities have reduced over consecutive rounds of surveys in every single district (Figure 5.3).

Figure 5.3: **Missed opportunities for vitamin A first dose - comparisons between Second and Third Rounds of RAPs (2004, 2005).**



A similar concordance effect might be expected between the first booster dose coverage of DPT/OPV and the second dose of vitamin A, particularly where the biannual months' strategy (see below) was not in place. However, since none of the surveys collected data on DPT/OPV boosters, it is not possible to comment on such as association and the missed opportunities in that context.

The biannual months' strategy

In five program states – Madhya Pradesh, Jharkhand, Orissa, Rajasthan and Uttar Pradesh - the respective state governments in partnership with stakeholders such as UNICEF, MOST, CARE, WHO and interested NGOs were implementing a biannual strategy for improving the coverage of vitamin A supplementation. This strategy was initiated at different times in different states - Orissa being the earliest to start, in 1999 followed by Rajasthan in 2002, Uttar Pradesh and Jharkhand in 2004 and Madhya Pradesh in 2005. The bi-annual strategy has been initiated in the states of Andhra Pradesh and West Bengal beginning 2006. As the endline survey and other assessments were conducted in early 2006 or earlier, the Andhra Pradesh and West Bengal results presented here do not reflect the influence of the biannual strategy intervention.

In the states of Jharkhand, Uttar Pradesh and Madhya Pradesh, CARE actively participated in the biannual distribution of vitamin A through providing support to micro-planning, communication efforts and capacity building of service providers, while in Orissa and Rajasthan, CARE's engagement has been very minimal.

The Government of Uttar Pradesh implemented the biannual strategy under the name of *Bal Swasthya Poshan Mah* (Child Health and Nutrition Months) and declared the months of May and November to intensify the activities related to child growth and development as well as micronutrient supplements coverage. A major thrust during these months is to increase the vitamin A supplementation coverage to more than 80 percent of children (nine months to three years) on the fixed routine immunization days (Wednesdays and Saturdays) as per the micro-plan of the ANM. It was planned to cover all districts over time in a phased manner. By 2005 a total of 30 districts were covered under this strategy. Out of these, 18 were supported by UNICEF and 12 by CARE.

The Government of Jharkhand is also following a biannual strategy and has declared June and December months as Child Health and Nutrition Catch-up Months to intensify the activities pertaining to child growth and development as well as micronutrient supplementation coverage. The strategy envisages a joint effort of ICDS and Health Department functionaries for reducing malnutrition and improving vitamin A supplementation and routine immunization coverage. Districts were phased in since the start up in 2004 and during the June 2005 catch-up round all blocks in the 22 districts were covered for enhanced activities related to vitamin A supplementation, measles vaccination and injection safety, deworming for young children and iron and folic acid supplementation.

All states showed significant improvements in first dose coverage, including the ones which implemented the biannual strategy before 2006. However, as can be seen from Table 5.2, the two-dose coverage increments from baseline to endline did not differ significantly between the states that followed the biannual strategy and those that followed the older strategy of administering the 2nd to 5th doses

in the routine course of overall program implementation. In fact, of the four states where coverage of more than 20 percent for two doses was achieved by the endline, Orissa was the only one that had followed the biannual months' strategy for a significant period of time. While the second dose did not show improvements in the states where the bi-annual strategy was being implemented, the first dose coverage increments suggest that the strategy may have helped prioritize the first dose of vitamin A and facilitate its delivery.

The reasons for limitations of routine and biannual approaches are not entirely clear, but there are some pointers available from field observations. The lists used for identifying children under three years of age during "biannual months" are generally freshly made every six months, using processes that are unlikely to be robust enough for ensuring inclusion of all children. Also, this listing is largely unsupervised, giving rise to the suspicion that significant proportions of children may not make it to the lists. Thereafter, the system for recording doses and reporting on the coverage during a biannual month session is not name-based, but based on tally-marking. This makes it nearly impossible to immediately verify, and thus difficult to supervise and monitor. Finally, the focus on all children 1-3 years old (or lately, 1-5 years old for a total of nine doses) probably takes away the focus from a critical second dose. Some of this could probably explain the very different estimates derived from reported coverage rates of biannual months and those found during surveys, including NFHS-3 and CES.

Supply disruptions vs. utilization of available supplies

One commonly held reason for lower coverage of vitamin A is the insufficiency of supply of vitamin A. On the face of it, this is indeed true. The routine supply of vitamin A (excluding that specially supplied by UNICEF during the biannual months) comes from the kit of supplies that each ANM receives from the RCH program of the MoHFW every six months, called Kit A. This kit contains six bottles of vitamin A liquid, theoretically sufficient for providing the required five doses of vitamin A to all children under three, assuming a birth rate of 30 per 1000 population and a coverage area of 5000 per sub-center area that one ANM holds the charge for, and assuming minimal wastage. In reality, ANMs cover larger populations, and in states such as Uttar Pradesh and Rajasthan, birth rates are still higher than the assumed norm. Also, the supply of Kit A is hardly ever on time. A combination of these factors would thus be expected to result in supply

Table 5.4: **Population covered by ANMs, ANM interviews, RACHNA Endline (2006)**

State	No. of ANMs interviewed	% ANMs covering a population of > 5000	% ANMs covering a population of > 7000
Chhattisgarh	*64*	26.1	13.0
Jharkhand	*23*	73.9	52.2
Madhya Pradesh	*92*	55.4	16.3
Orissa	*98*	49.0	19.4
Rajasthan	*80*	59.0	36.2
Uttar Pradesh	*74*	82.4	25.7
West Bengal	*108*	75.0	27.8
All	***539***	**59.7**	**25.0**

(Data from Andhra Pradesh was inadequate for this analysis)

Table 5.5: **Number of bottles of vitamin A liquid available with ANM at the time of interview, endline survey (2006)**

No. of bottles of vitamin A in stock	Andhra Pradesh	Chhattis-garh	Jharkhand	Madhya Pradesh	Orissa	Rajasthan	Uttar Pradesh	West Bengal	Total
N	*62*	*46*	*46*	*91*	*98*	*55*	*71*	*108*	*577*
0	21.0	4.3	8.7	20.9	5.1	20.0	25.4	10.2	14.4
1-3	46.8	58.7	60.9	34.1	45.9	43.6	59.2	45.4	47.7
4-6	27.4	28.3	17.4	35.2	30.6	30.9	11.3	35.2	28.3
7+	4.8	8.7	13.0	9.9	18.4	5.5	4.2	9.3	9.7

shortages. That is, if there were sufficient effort to cover all children, supply shortages should prevent full coverage of all eligible children.

Data from RACHNA surveys provides some evidence that allows the part testing of some of these hypotheses. A sample of ANMs was interviewed in each state, where questions related to vitamin A supplies and utilization were asked. As shown in Table 5.4, about 60 percent of ANMs report that they serve a population of more than 5000, and about 25 percent that they serve a population of more than 7000, with variation across states. Table 5.5 shows the number of bottles of vitamin A liquid reportedly available with ANMs at the time of interview. About 15 percent reported that they had no vitamin A in stock and the median number of bottles in stock (partly used or unused) varied between two and four. Since each carton of Kit A contains six bottles, this number of in-stock bottles is to be expected if the supplies of Kit A reach the ANM with reasonable timeliness. ANMs were asked when they last received a supply of Kit A. As shown in Table 5.6, more than 50 percent reported receiving the last supply within the previous six months, and almost 90 percent had received the kit within the previous 12 months. The variation across states is wide and interesting. In only two states – Andhra Pradesh and Jharkhand - did more than 20 percent ANMs report that they had not received Kit A for more than 12 months, and in Andhra Pradesh, the remaining 80 percent had received it within the previous six months. A sample of AWW were also interviewed at the endline, and asked whether vitamin A was given at the AWC. With the exception of West Bengal, where 76 percent of AWW reported that vitamin A was given, almost all AWW in the remaining states reported that it was given out at the AWC (data not shown). They were also asked when vitamin A was last given to children. As Table 5.7 shows, at least in four states, Madhya Pradesh, Orissa, Rajasthan and Uttar Pradesh, between a quarter and a half of AWW reported that vitamin A was not administered on the last immunization day,

Table 5.6: **Duration since the receipt of the last supply of Kit A, as reported by ANMs, RACHNA endline (2006)**

Months since Kit A was received	STATE								Total
	Andhra Pradesh	Chhattis-garh	Jharkhand	Madhya Pradesh	Orissa	Rajasthan	Uttar Pradesh	West Bengal	
N	*58*	*44*	*42*	*64*	*91*	*47*	*67*	*71*	*484*
0-5 months ago	79.3	97.7	59.5	43.8	39.6	59.6	31.3	31.0	51.4
6-9 months ago	0.0	0.0	19.0	12.5	16.5	23.4	35.8	26.8	17.6
10-12 months ago	0.0	0.0	0.0	29.7	33.0	8.5	23.9	36.6	19.6
13 or more months ago	20.7	2.3	21.4	14.1	11.0	8.5	9.0	5.6	11.4

Table 5.7: **Vitamin A last given in the village, as reported by AWWs, endline (2006)**

	Andhra Pradesh	Chhattis-garh	Jharkhand	Madhya Pradesh	Orissa	Rajasthan	Uttar Pradesh	West Bengal
AWWs interviewed	*157*	*150*	*99*	*172*	*151*	*124*	*128*	*127*
On last immunization day	83.5	89.0	89.9	64.5	55.0	42.7	65.6	91.3
Earlier than that but within six months	14.9	10.0	8.1	27.3	43.0	54.0	32.0	7.1
Earlier than six months ago	1.6	0.7	2.0	8.1	2.0	3.2	2.3	1.6

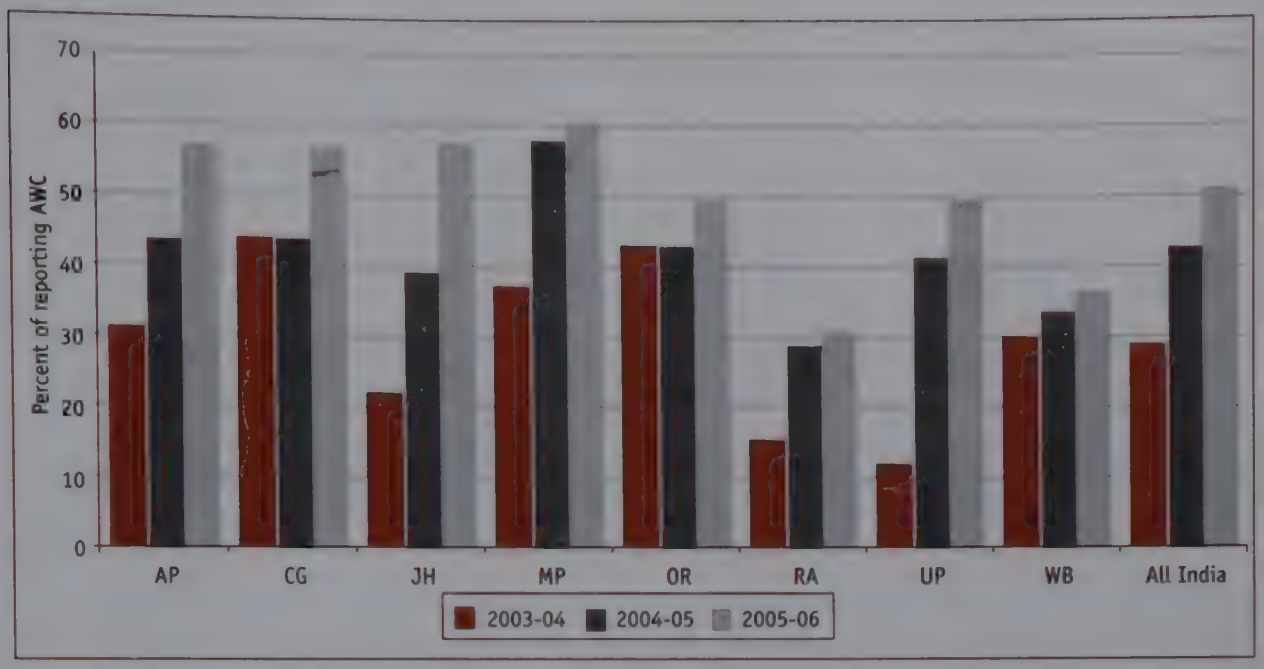
but virtually all of them reported that it was administered within the previous six months. Other than Madhya Pradesh, the other three states espouse the biannual strategy, which may explain why the availability of vitamin A on the last immunization day was lower. In the remaining four states (including Jharkhand, which follows the biannual strategy), almost all AWW reported that vitamin A was given to children on the previous immunization day. The likely reason why availability was high in Jharkhand despite administration occurring mainly in the biannual rounds is that the biannual round had just concluded in the month before data collection for the survey. Although these are all self reports, taken together, they seem to indicate that, while supplies of vitamin A are not entirely smooth, the shortages are unlikely to be severe.

From coverage data discussed earlier, it appears that about 60 percent children receive one dose, 25 percent two doses, 12 percent three doses, and presumably far fewer receive more than three doses (data is not available from RACHNA surveys for the remaining doses). On the average then, significantly less than a quarter of the children under three years old receive their doses of vitamin A. This level of distribution is far less than the level of supply estimated from what has been seen above. Clearly, supplied vitamin A is not being adequately utilized.

Program monitoring data bears this out. As part of the routine monthly reports submitted from all of the over 95,000 AWC covered under RACHNA, AWW had reported on whether vitamin A was administered (by the ANM) to children during the Nutrition and Health Day (NHD) the previous month. This applies to all states, including those following the biannual strategy, since even in these states, the policy is for the first dose to be administered along with measles vaccine. As seen in Figure 5.4, less than 30 percent of the AWC reported that vitamin A was administered during the previous month in 2003 to 2004. In two of the states that achieved relatively high coverage rates by the endline (Orissa and West Bengal), the proportion of AWC reporting administration of vitamin A the previous month remained almost unchanged over the three years for which data is available. In all other states, there is a clear progression towards greater utilization of vitamin A supplements. Since this seems to be a phenomenon spread across all states, and because we know that there was no dramatic improvement in the supply situation during these three years, these increases (in reported vitamin A distribution, and in vitamin A coverage in many of these states) must reflect the increases in utilization of available vitamin A. It is tempting to believe that this has come about as a result of the greater priority and visibility for vitamin A supplementation over these years.

In Orissa and West Bengal, significant coverage increases were achieved despite no change in proportion of AWC reporting distribution of vitamin A every month. This

Figure 5.4: **Proportion of AWW reporting that vitamin A was administered during NHD in the village during the previous month, program monitoring data, 2003 to 2006.**



is presumably due to improved tracking and capturing of children in each village. In Andhra Pradesh, where the proportion of villages reporting distribution of vitamin A in the previous month has gone up, and high levels of coverage have been achieved, both, wider awareness of the need to ensure distribution of vitamin A during NHD and better tracking of children due for the supplement, could have been responsible.

Greater priority and awareness about vitamin A deficiency

At the endline, the sample of ANMs interviewed demonstrated fairly high levels of awareness of basic dosing issues: overall, about 75 percent (57-98 percent in different states) were aware that a child should receive five doses before the age of three years. An additional 9.5 percent said six doses. The next most common answer was three doses. Among AWW, too, the picture was similar – almost two thirds of them were aware that five doses must be given by the age of three years, and less than 15 percent said two doses or less should be given. Also, more than two-thirds of them could correctly tell the age at which the first two doses of vitamin A should be administered to children, and more than 90 percent mentioned vitamin A when asked what other service a child should get along with the shot of measles vaccine. Thus, the problem of low coverage is not one of simple lack of awareness of dosing schedules, either.

The AWW interviewed at the endline (about 150 in each state) were asked, through a card-sorting exercise, to rank interventions and activities they focused on in the previous three months, and then through a separate exercise, to similarly rank interventions and activities that their supervisor had asked them to prioritize during the same period. Consistently across all states, vitamin A is among the least prioritized interventions among the twelve listed, figuring in the top three priorities for 2-21 percent of AWW in different states. As reported by the AWW, vitamin A figures among the lowest of their supervisors' priorities, but figures in the top three priorities somewhat more frequently than in the case of the AWWs' own activities, ranging from 3-30 percent. This could indicate that, while the supervisors do "push" vitamin A, this probably does not have the emphasis needed to get the AWW to act vigorously. Similar ranking exercises during the RAPs of panel districts had yielded similar results.

While awareness of simple dosing may be high, the perception of vitamin A as a useful medicine is probably limited, at least among AWW. When they were asked

who all should be given vitamin A, not even 10 percent of them mentioned women or children having night blindness or other signs of vitamin A deficiency. Perhaps it is this minimalist, task-orientedness of the vitamin A strategy that deprives vitamin A supplementation of the priority that it deserves.

Table 5.8 presents analysis of AWW interviews from Rounds 2 and 3 of period assessments. In the panel districts of Andhra Pradesh, Uttar Pradesh and West Bengal coverage rates showed significant improvements over rounds (data not shown). These are also the districts where (Table 5.8) a higher percentage of AWWs have reported or demonstrated delivery of vitamin A (given in the last six month and given at the AWC), increased knowledge levels (in terms of number of doses to be given, correct ages and who all should get it) and have also reported a better reporting and tracking mechanism (entering the dose as soon as it is administered, making a due list for 2nd and later doses). None of the other states has shown consistent improvements.

Other Program Interventions that could have Influenced Vitamin A Coverage

A number of different approaches were used over the last several years to effect change in the reach of vitamin A. Many of these inputs are not easy to quantify, but could still have been crucial in bringing about change. These are described briefly below, but some of them are dealt with in more detail in another working paper in this series, *Working with Existing Systems.*

Using evidence-base for prioritization and integration into district plans

In many districts, both systems, Health and ICDS, went through a process which prioritized vitamin A as a crucial intervention (among many others also simultaneously prioritized) for child survival and health. This process included use of global and country evidence to highlight the criticality of this intervention.

Micro-planning support

Micro-planning which defined clear roles and responsibilities including a monitoring and evaluation plan was an important contributing mechanism (this was specific to Jharkhand and Uttar Pradesh where CARE actively supported the implementation of the biannual strategy). In some states, this process involved revision of routine immunization micro-plans at the block level and sharing the same with ICDS. Timely updating of the bi-annual ICDS survey and listing of under-three eligible children at village level were the other sub-components. In the states of Jharkhand and Uttar Pradesh, streamlining supply of vitamin A liquid with support from UNICEF was also facilitated.

Capacity building

Capacity building with critical content on vitamin A including dosage, age groups, administration, benefits and recording appeared to contribute to the gains. This would presumably lead to increase in knowledge and awareness levels among service providers and consequently to better coverage. Such as association has been reported in the previous section.

Behavior Change Communication

In Jharkhand and Uttar Pradesh with support from MOST/USAID, there was a special Behavior Change Communication component for promoting vitamin A

Table 5.8: **Processes related to vitamin A distribution, as reported by AWW, RAPs, Round 2 (2004) and Round 3 (2005)**

Indicator	Andhra Pradesh		Chhattis-garh		Jharkhand		Madhya Pradesh		Orissa		Rajasthan		Uttar Pradesh		West Bengal	
	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3	R2	R3
All AWW	*80*	*103*		*82*	*73*	*73*	*90*	*88*		*86*	*90*	*80*	*90*	*81*	*85*	*90*
Vitamin A given at the center	81.3	96.1		93.9	100.0	95.9	83.3	85.2		100.0	84.4	95.0	68.9	91.4	68.2	94.4
AWW reporting that vitamin A is given at the AWC	*65*	*99*		*77*	*73*	*70*	*75*	*75*		*86*	*76*	*76*	*62*	*74*	*58*	*85*
Last time vitamin A given at the AWC, when:																
Last immunization day	70.8	81.8		75.3	75.3	52.9	45.3	54.7		89.5	39.5	34.2	62.9	71.6	44.8	67.1
Earlier than that but within last six months	20.0	16.2		18.2	23.3	40.0	53.3	36.0		7.0	52.6	59.2	35.5	16.2	39.7	29.4
Earlier than six months ago	9.2	2.0		6.5	1.4	7.1	1.3	9.3		3.5	7.9	6.6	1.6	12.2	15.5	3.5
Vitamin A is given to whom:																
Children nine months old, along with measles vaccine	64.6	90.9		93.5	78.1	82.9	80.0	85.3		77.9	53.9	56.6	82.3	89.2	74.1	78.8
Children 1-3 years old	78.5	93.9		50.6	52.1	21.4	68.0	44.0		58.1	65.8	59.2	53.2	66.2	53.4	69.4
To those deficient in vitamin A / having night blindness	38.5	30.3		6.5	31.5	5.7	17.3	17.3		25.6	32.9	22.4	4.8	24.3	12.1	37.6
Any one of the above	100.0	99.0		100.0	94.5	88.6	96.0	94.7		100.0	96.1	85.5	90.3	97.3	98.3	97.6
When 2nd or later doses of vitamin A are entered in the register:																
Do not enter	30.8	7.1		7.8	6.8	15.7	10.7	10.7		9.3	19.7	25.0	21.0	16.2	22.4	4.7
Entered as each the child gets the dose	60.0	91.9		83.1	68.5	55.7	64.0	66.7		50.0	46.1	63.2	72.6	74.3	63.8	83.5
From rough listing made while giving vitamin A	7.7	1.0		9.1	16.4	27.1	20.0	22.7		39.5	25.0	7.9	4.8	8.1	12.1	11.8
From memory	1.5	0.0		0.0	4.1	1.4	2.7	0.0		1.2	3.9	3.9	0.0	1.4	0.0	0.0
Dosage schedule:																
First dose given at nine months	29.2	73.7		96.1	83.6	88.6	72.0	90.7		77.9	57.9	65.8	71.0	89.2	72.4	84.7
Second dose given at 15/18 months	55.4	91.9		97.4	63.0	87.1	69.3	72.0		76.7	76.3	72.4	66.1	73.0	75.9	74.1
Three doses by age three	20.0	2.0		1.3	16.4	21.4	13.3	16.0		14.0	19.7	10.5	17.7	9.5	8.6	5.9
Five doses by age three	55.4	89.9		90.9	26.0	40.0	41.3	52.0		50.0	22.4	28.9	38.7	62.2	29.3	62.4

Round 2 data is not available for Chhattisgarh and Orissa, because these two states were the first to be surveyed during this round, and the earlier version of the AWW interview questionnaires used in these districts did not include these questions

supplementation. Materials and mediums included flip-charts, job-aids, posters, radio spots and miking. These were developed with involvement of both Health and ICDS, UNICEF, CARE and other stakeholders.

Convergence

Convergence of ICDS and Health at district, block and village levels was probably crucial to success. A fixed-day fixed-site approach for administration of vitamin A where the ANM and AWW deliver a package of nutrition and health services at the AWC which included vitamin A probably contributed to observed improvements. Evidence for increases in the use of vitamin A on immunization days has been presented earlier.[2]

Recording and Tracking

Facilitation for improving tracking and recording of vitamin A particularly in ANM and/or AWW registers was undertaken in most states. Between 60 and 100 percent of AWWs and ANMs reported entering the second or later doses in the register as soon as the child is administered vitamin A at the endline. In the state of Uttar Pradesh, CARE and MOST supported monitoring and reporting of vitamin A by ICDS and Health using special formats.

Reviews and problem solving

Block and sector level meetings were utilized as opportunities for reviews, problem solving and on-going capacity building. Particularly during the last two years of the program there was explicit focus on understanding coverage levels with vitamin A supplementation and working out solutions to increase coverage rates.

Conclusions

The high prevalence of maternal night blindness found at the endline indicates that vitamin A deficiency continues to be a significant public health problem. While there are currently no large scale interventions to mitigate adult vitamin A deficiency, the vitamin A supplementation program of the Government of India that targets children under three years of age holds the potential of reducing the impact of this deficiency on child morbidity and mortality. Among other interventions, the RACHNA program attempted to help the ICDS and health programs maximize coverage of vitamin A among children.

Over the life of the program, there was a substantial increase in the proportion of children 12 to 23 months old who received one dose of vitamin A, with significant increases across the states. Starting from very poor baselines, there were even more significant increases in the proportion of children receiving two doses, but the achieved rates are still low, with four of the eight states unable to achieve even 20 percent coverage for two doses. On the basis of the few available sources of comparable data, it appears that RACHNA-assisted areas are doing better than other areas in many of the program states, at least in terms of minimizing missed opportunities for the first dose of vitamin A. It is clear that while the first

[2] Many other papers in the series, notably *Widening Coverage of Primary Immunization* and *Supplemental Feeding*, deal in detail with the influence of Nutrition and Health Days (NHD) on service coverage.

dose of vitamin A coverage closely corresponded to measles vaccine coverage at the endline, as envisaged by the program, the dramatic fall in the coverage of subsequent doses is indicative of major program failure to sustain momentum.

The primary reasons for most states being able to push up first dose coverage rates to those comparable to measles vaccine appear to be a greater emphasis on the use of vitamin A on immunization days, highlighting of the importance of vitamin A as an intervention for child health, and the policy and program environment provided by the biannual strategy, possibly helped on by a tendency to "fill in" the vitamin A dose on the card while administering measles vaccine. The capturing of more children appears to have been achieved through mechanisms common to the immunization program. Since, in most states, the proportion of children being immunized at the AWC has increased substantially with time,[3] there is good reason to believe that ICDS has had a strong role to play in achieving this increase. There are still more than 10 percent of children given measles vaccine but not vitamin A in three of the eight states, but this should be correctable with continued emphasis.

The lesser achievement for doses beyond the first needs more careful attention. The two states that actually achieved more than 40 percent coverage among children 18-23 months provide some clues to what might help. Apparently, in many parts of West Bengal, vitamin A (and immunization) services are provided by ANMs mostly from sub-centers, and not through AWC, and people are willing to walk the extra mile to access these services at the health sub-centers. Yet, AWW are involved in motivating mothers to go and access immunization, and vitamin A, and with regard to these two services at least, ICDS and health systems seem to be able to work closely together. In Andhra Pradesh, again, a strong push from the health system appears to have been responsible, including a greater emphasis on recording and reporting on later doses of vitamin A as well. The only other state to have achieved significant levels for the second dose is Orissa (about 31 percent), again a state known to have relatively strong systems.

The biannual strategy has been implemented in Orissa since 1999. Compared to the effort involved, the two-dose coverage (31 percent) is disappointing. Even in the other states using the biannual months' strategy, the increases have been primarily for the first dose. One might allow for the possibility that, since the biannual strategy has taken off relatively recently in Madhya Pradesh, Uttar Pradesh and Jharkhand, the high one-dose coverage could, to an extent, reflect a recent "mopping-up" of the backlog of children who had never received a single dose so far, and so are reporting only one-dose coverage. However, this can be at best a temporary and limited explanation. A more likely explanation seems to be that, as in the case of West Bengal and Andhra Pradesh, it is greater internal accountability and oversight that matters, irrespective of the strategy used. The consistently low priority accorded to vitamin A supplementation relative to other interventions, reported above, supports this view. A greater consistency in supervision and monitoring of whatever approach used should help. At the moment, however, one conclusion that all systems and agencies concerned with the vitamin

[3] See paper, *Widening Coverage of Primary Immunization*, in this series.

A supplementation program in India must face up to is that we still do not have a reliable mechanism to take vitamin A to children beyond the first dose.

A well-known but often forgotten point in understanding estimates from surveys is that they are averages that hide variation. A comparison of estimates from the endline and the RAPs for the panel districts of the same states (data not shown) demonstrates this once again. While the estimates for Andhra Pradesh, Orissa and West Bengal are comparable to their respective panel districts, the same is not true for Chhattisgarh, Jharkhand and Rajasthan. Recognizing and addressing such variability may hold the key for achieving better outcomes.

The lower than expected coverage rates should also prompt us to examine the methods used for estimation of coverage rates. One tempting explanation is that during interviews, mothers do not recognize or remember whether their children had been given vitamin A liquid, and taken together with the apparent lack of effort on part of ANMs to note the administration of subsequent doses on the immunization card, the estimates for second and subsequent doses are underestimates. This is supported by the observation that mothers' recall-based estimates for even the first-dose coverage is consistently lower than card-based estimates, across virtually all states, and has been so since the baseline.[4] The truth may lie somewhere between the (possibly under-reported) mothers' recall-based estimates and the (possibly over-reported) card-based estimates, at least for the first dose. Even if this is true, the under-reporting by mothers cannot be very large, and two-dose estimates may at best be a few percentage points higher than derived from the endline survey. Both, the increasing first-dose estimates, as well as the consistently low estimates for subsequent doses must therefore be largely true.

Taken together, the INHP experience appears to indicate that the key to quickly increasing vitamin A coverage, even for doses beyond the first one, is for the ICDS and RCH programs to prioritize and closely supervise mechanisms for tracking individual children. The correction of supply deficiencies will begin contributing to improved coverage when these fundamental processes begin functioning with consistency and reliability.

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[4] The estimates in Table 5.1 are based on a combination of card and recall information. However, the recall-based estimates, which are 10-20 percent lower than card-based estimates for the first dose in many states, have also increased significantly from the baseline to the endline in most of the states. In the case of the second dose, the reverse is true – recall-based estimates are generally higher than card-based estimates.

B. Widening Coverage of Iron Supplements

Background

Iron-deficiency anaemia is the most common form of undernutrition in the world and is the eighth leading cause of disease in girls and women in developing countries (World Bank, 1993). Its estimated prevalence in South-East Asia population is 50 to 70 percent (Garcia and Mason, 1992). Whereas severe anaemia is closely related to risk of mortality, even mild anaemia carries health risks and reduces the capacity to work.

Maternal anemia has been shown to have non-significant association with neonatal and perinatal deaths as reported from population-based studies (Lawn et al, 2005). Studies have shown that supplementation of anemic or non-anemic pregnant women with iron, folic acid or both does not appear to increase either birth weight or the duration of gestation, but this needs further exploration (Rasmussen, 2001).

Iron is a key constituent of hemoglobin of the red cells in the blood, and thereby central to the oxygenation of body tissues and organs. A large proportion of anemia in women and children is attributed to iron deficiency, and this is known to coexist with virtually any other cause of anemia, such as falciparum malaria, sickle cell and other hemoglobinopathies, and a number of chronic bleeding disorders, including hookworm infestation. Women are at greater risk of iron deficiency because of excess loss in menstrual cycles and excess need during pregnancy. The primary cause of iron deficiency in situations such as in India is believed to be poor dietary sources of iron compounded by a number of factors that prevent effective iron absorption. "Subclinical" iron deficiency, that is, where the anemia is not yet apparent, is known to affect cognition and learning. At sub-cellular levels, iron is known to be critical to a number of metabolic processes shared by a wide range of living beings, the functional implications of all of which are not adequately understood. Iron is stored in several forms in the body for prolonged periods, some of which are readily available for inclusion into hemoglobin, others less so. A combination of such characteristics probably explains the complexity of human response to iron deficiency and iron supplementation (WHO, 2004).

Infants and young children are particularly vulnerable to iron deficiency and to anemia. This arises from the fact that they are born with inadequate iron stores when mothers themselves are iron deficient, and that breast milk is a relatively poor source of iron. Typically, these stores run out by about six months of age. To compound this, breast milk iron, although of good quality (easily absorbable) is insufficient to compensate for major deficiency, and anemia often manifests during infancy itself. This worsens further when complementary feeding is delayed, or is poor in iron content, or contains substances that retard iron absorption. Further, the high incidence of infections (including worm infestation) during this period places greater pressure on iron availability and utilization.

NFHS-2 and NFHS-3 have reported anemia levels of 74.2 and 79.2 in children belonging to age group of 6-35 months respectively. In even married women of

age 15-49 years, the incidence was reported to be 56.2 by NFHS-2 and 51.8 by NFHS-3 (in the range of 51.5 in urban and 58.2 in rural areas). The reported level of anemia during pregnancy was 49.7 in NFHS-2 and 57.9 in NFHS-3 (in the range of 54.6 in urban and 59 in rural).

Supplementation of pregnant women remains the cornerstone policy for reducing anaemia among women of reproductive age, because the demands of child-bearing, high fertility rates, and breastfeeding are associated with undernutrition and maternal depletion. Little progress has been made in reducing iron-deficiency anaemia among women in developing countries, in spite of the introduction of iron-supplementation programs in many of them. Under the Reproductive Child Health (RCH) and ICDS programs, iron-folate supplements are provisioned for a number of especially vulnerable groups. Policy recommendations for iron supplementation include providing 100 mg of elemental iron daily for 100 days during pregnancy, weekly for adolescent girls, and 20 mg of elemental iron daily for one hundred days each year for preschool children. The RCH program supplies iron-folate in these formulations and the ICDS program assists their distribution to women and children. Despite a long history in these programs, these supplements do not routinely reach large proportions of women and most children. The NFHS and similar surveys provide estimates of the extent of receipt and consumption of iron supplements during pregnancy, but do not estimate coverage of pediatric iron supplements. NFHS-2 estimated that about 57.6 percent of pregnant women across the country received any iron supplements. The rates for specific states showed wide variation, and were very low in many of RACHNA-assisted states.

The RACHNA program originally envisaged that it would attempt to help increase the coverage of both, maternal and pediatric supplementation with government-supplied iron-plus-folic acid (IFA) tablets. As several other interventions more directly related to child mortality and malnutrition took greater precedence, the emphasis on IFA, particularly pediatric IFA, remained low. This paper presents results from available evidence to show how coverage rates were influenced, and the operational lessons that emerged from this experience.

Methods of Assessment

The evidence for coverage of IFA comes from the same household surveys as described for vitamin A supplements earlier in this paper. Data from interviews of mothers of children 0-5 months of age is used to estimate IFA coverage during pregnancy.

Results and Discussion

Prenatal IFA Supplementation

Changes in Receipt and Consumption of IFA Tablets Over Time

Table 5.9 presents state specific estimates of receipt and consumption of IFA tablets during pregnancy in baseline and endline surveys.

There were increments of more than 10 percentage points between the baseline and the endline in the proportion of women who reported receiving any IFA tablets

in states other than Rajasthan and Uttar Pradesh. In the remaining six states, at least 80 percent of the women reported receiving at least some IFA tablets at the endline.[5] At the endline, the proportion of women receiving at least the recommended minimum number of tablets during pregnancy (90 tablets) was more than 60 percent in two states (Orissa and West Bengal), around 50 percent in five other states and less than 25 percent in Rajasthan. This represented an increase of about 25 percentage point or more in seven of the states and about 14 percentage points in Rajasthan. The mean number of tablets received also increased substantially, ranging from 17 tablets in Rajasthan to 44 tablets in Jharkhand.

The reported consumption of at least 90 IFA tablets, influenced considerably by the proportion receiving at least 90 tablets, increased 10 percentage points or more in seven of eight states, and by more than 20 percentage points in five of them, between the baseline and endline. The highest proportion reporting minimum recommended consumption was in Orissa, at almost 60 percent. The mean number of tablets consumed by those who consumed any tablets increased by 11-72 tablets in six states, and did not change in two others. A common perception among field staff is that women generally do not consume tablets, and consumption self-reported by women may be exaggerated. This is difficult to verify from survey data alone.

Comparisons with Non-RACHNA Covered Areas

There are significant differences in the methods used to estimate iron supplementation coverage by NFHS-3 and the RACHNA endline, making straightforward comparisons difficult. NFHS-3 provides estimates of receipt and consumption of any iron supplements reported to have been received by the women, whereas RACHNA surveys attempt to identify and estimate receipt and consumption only of government-supplied IFA tablets, tentatively identified in the endline survey using sample strips of government-supplied tablets shown to interviewees. NFHS-3 records and reports consumption in total number of days, while RACHNA attempts to record actual number of tablets. Finally, NFHS-3 reports estimates consumption rates in pregnancy for a much wider age group (women with a live birth in the previous five years) than the RACHNA survey, which reports on a 0-6 months recall period. While the effects of the first two differences might be expected to act in different directions, the effect of the third is less predictable. With these caveats, the reported rates of consumption of 90 or more tablets during pregnancy in NFHS-3 and the RACHNA endline are compared in Figure 5.5. Other than in Andhra Pradesh and Rajasthan, reported consumption in RACHNA assisted areas can be seen to be substantially more than the states averages represented by NFHS-3 estimates.

The other source of comparative information is the nutrition evaluation research study, which compared a number of nutrition indicators between two RACHNA-assisted districts and ICDS areas in two comparison districts. Estimates for four indicators – receipts of any IFA supplements, receipts of 90 or more IFA tablets, consumption of 90 or more IFA tablets, and consumption of all tablets received – all

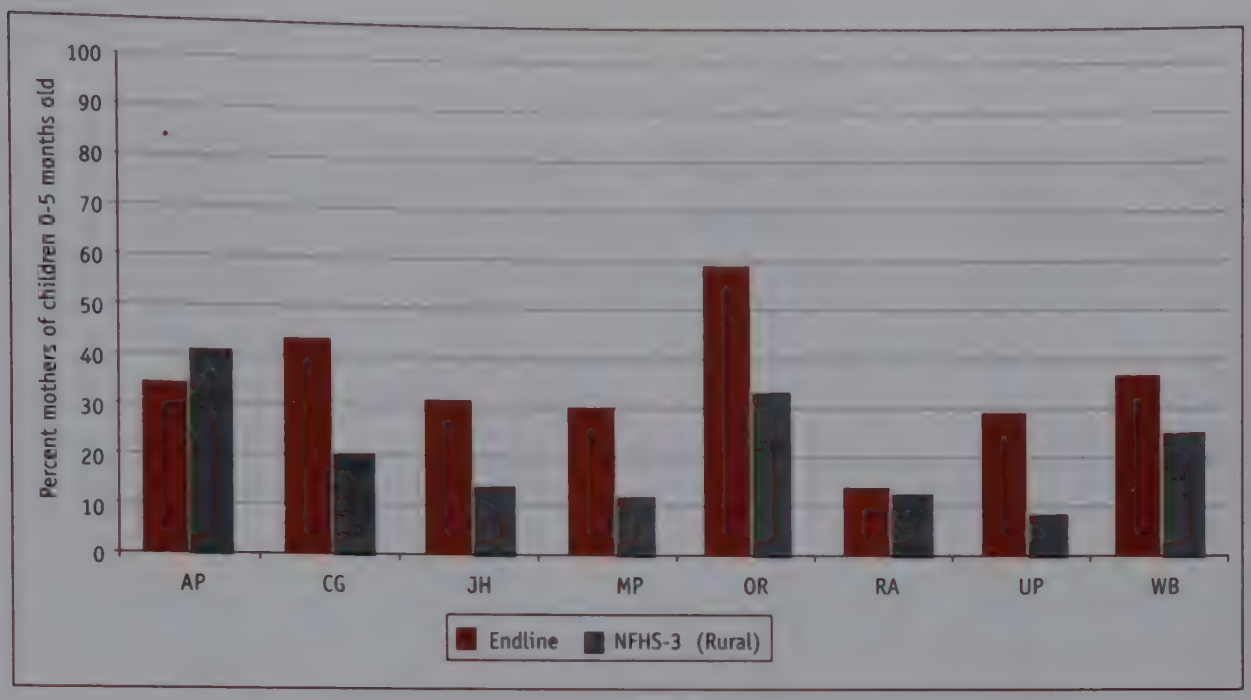
[5] This pertains to IFA tablets supplied by government programs, a sample of which was shown to the women when asking questions about receipt and consumption.

Table 5.9: **The receipt, consumption and sources of government supplied IFA tablets during pregnancy, RACHNA Baseline (2001), Endline (2006)**

	AP			CG			JH			MP			OR			RA			UP			WB		
	BL	EL	Diff	BL	EL	Diff	BL	EL	Diff	BL	EL	Diff	BL	EL	Diff	BL	EL	Diff	BL	EL	Diff	BL	EL	Diff
Receipt and consumption of Iron Folate Tablets during Pregnancy																								
n[1]	*192*	*670*		*172*	*686*		*150*	*590*		*172*	*614*		*185*	*690*		*221*	*623*		*253*	*614*		*197*	*634*	
Received any IFA tablets during pregnancy	67.8	85.1	**17.3**	70.6	86.6	**16.0**	51.7	80.9	**29.2**	**70.6**	**89.2**	**18.6**	80.3	93.2	**12.9**	47.1	54.1	**7.0**	63.1	71.1	**8.0**	**71.1**	89.6	**18.5**
Received 90+ IFA tablets during pregnancy	21.2	48.8	**27.6**	23.7	51.8	**28.1**	7.6	46.1	**38.5**	23.7	47.8	**24.1**	42.1	69.5	**27.4**	9.4	23.5	**14.1**	11.2	44.9	**33.7**	**28.8**	61.0	**32.2**
Mean number of IFA received	36.4	73.0	**36.6**	44.5	71.7	**27.2**	19.3	63.1	**43.8**	**44.5**	72.3	**27.8**	66.7	98.4	**31.7**	19.9	37.0	**17.1**	27.3	63.0	**35.6**	**47.3**	88.6	**41.3**
Consumed 90+ IFA during pregnancy	13.7	34.1	**20.3**	16.8	43.2	**26.4**	5.9	31.2	**25.3**	16.8	29.6	**12.9**	33.0	58.9	**25.9**	5.4	13.5	**8.1**	5.5	28.8	**23.3**	**21.7**	36.5	**14.9**
Failed to consume 90+ tablets despite receiving 90+ tablets	35.3	30.2	**-5.1**	29.3	16.6	**-12.7**	22.7	32.4	**9.7**	29.3	38.0	**8.7**	21.6	15.2	**-6.4**	42.4	42.6	**0.2**	51.1	35.9	**-15.2**	24.8	40.1	**15.3**
n[2]	*41*	*327*		*41*	*355*		*11*	*272*		*41*	*293*		*78*	*480*		*21*	*146*		*28*	*276*		*57*	*387*	
Mean number of IFA consumed	70.2	66.0	**-4.3**	45.5	61.6	**16.2**	37.3	57.8	**20.5**	45.5	56.8	**11.3**	27.5	99.0	**71.5**	31.8	33.9	**2.1**	9.1	60.0	**50.9**	45.8	61.3	**15.6**
Source of Iron Folate Tablets																								
n[3]		*572*			*594*			*483*			*548*			*645*			*334*			*434*			*568*	
Government supply tablets																								
AWW		34.6			69.0			74.3			66.1			75.5			53.9			47.2			6.9	
ANM/LHV		58.0			32.7			19.7			30.5			24.7			36.2			46.8			87.7	
AWW/ANM/LHV		88.1			95.8			89.2			92.9			96.7			86.2			90.1			94.0	
Non-government source supplements (presumably iron)																								
Private doctor/chemist	65.5	65.7	**0.2**	27.5	16.8	**-10.7**	41.1	13.7	**-27.4**	27.5	25.0	**-2.5**	13.3	22.3	**9.0**	32.5	20.9	**-11.6**	25.2	19.7	**-5.5**	44.2	36.5	**-7.7**

n[1]: Mothers of children 0-5 months old; n[2]: Mothers of children 0-5 months old who received 90+ IFA tablets; n[3]: Mothers of children 0-5 months old who received any IFA tablets.

Figure 5.5: **Proportion of pregnant women consuming at least 90 IFA tablets, RACHNA vs NFHS-3.**



among mothers of children born in the previous 24 months, are presented in Table 5.10. As shown, the increments in the estimates for all four indicators are significantly higher in the intervention district in Uttar Pradesh, while two of the indicators are higher than the comparison in the intervention district in Andhra Pradesh.

Factors Influencing Coverage: Receipt and Consumption

The influence of receipt on consumption

In general, consumption increased to more or less a similar extent that receipt increased, although a significant gap remained in all states in terms of the proportion of recipients of 90+ tablets failing to consume 90+ tablets (Table 5.9). This gap had a range of about 15-40 percent, across different states at the baseline as well as the endline. A commonsensical explanation for this finding would be that, as service providers became more regular in taking IFA to women, the women also became more serious about remembering to consume tablets, but this was not sufficient to persuade all women to consume all tablets.

The source of IFA and receipt

More than 88 percent of the government supply IFA in all states was given to women by either the ANM or the AWW at the endline (Table 5.9). In West Bengal, almost all of it came from the ANM, and in Andhra Pradesh, about two thirds of it came from the ANM. In Uttar Pradesh, equal proportions came from the AWW and ANM. In the remaining five states, the AWW was the predominant source of women receiving IFA tablets. Since the baseline survey did not provide source information, serial data from periodic rapid assessments (RAPs) conducted in one district in each state was examined to see how the source of IFA tablets could have influenced receipt and consumption of IFA. Information was available for the source of each batch of IFA received by women.[6] From this, the total number of batches of IFA received by all women was computed, as well as the proportion of these batches that came from AWW and ANM. As shown in Figure 5.6, shifts occurred in some districts between the two rounds in terms of the relative proportions of IFA that came from ANM or AWW. In four districts – in Chhattisgarh, Madhya Pradesh, Orissa and Uttar Pradesh – the proportion contributed by the AWW

[6] Typically, women received IFA is 2-3 batches of 30-50 IFA each.

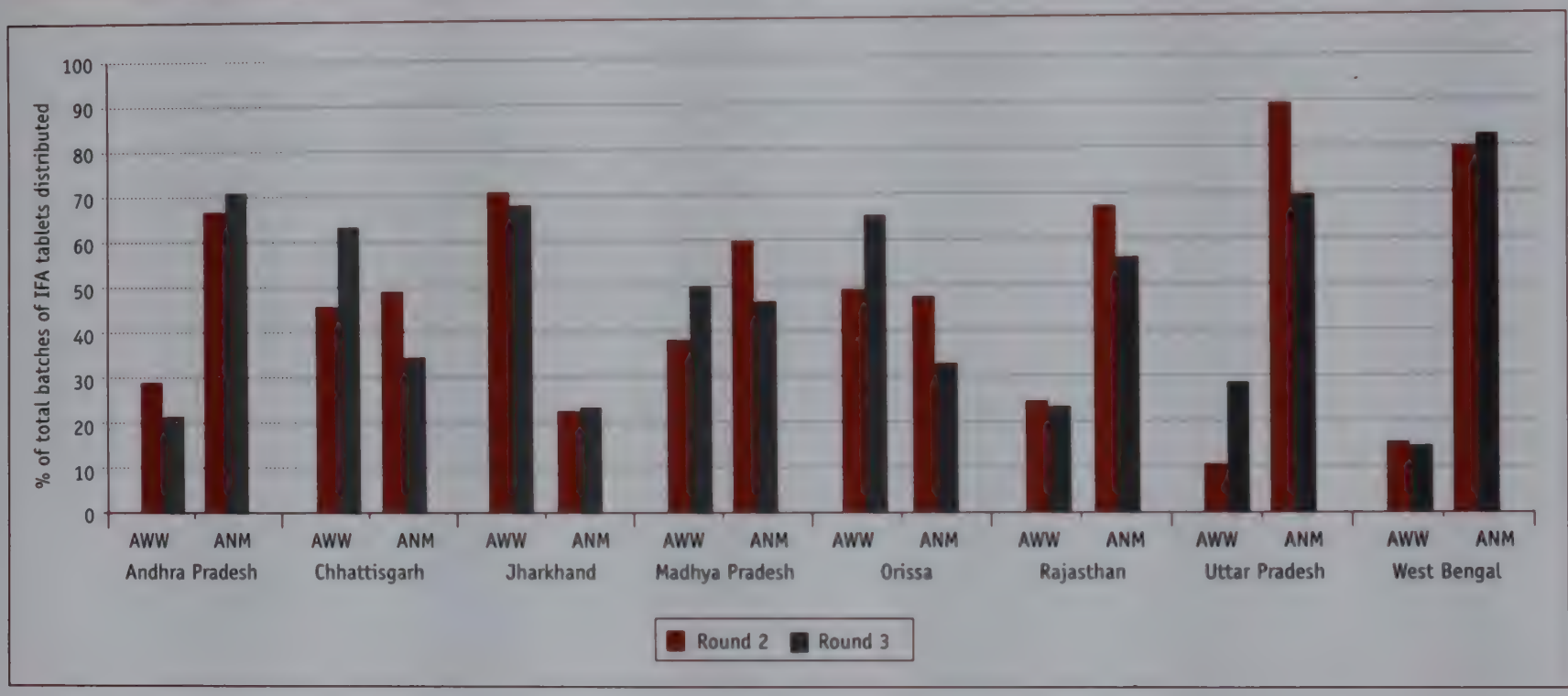
Table 5.10: **Receipt and consumption of IFA tablets during pregnancy, intervention and comparison districts of Andhra Pradesh and Uttar Pradesh, Nutrition Evaluation Research Study (2003-2006)**

	Andhra Pradesh							Uttar Pradesh						
	Karimnagar (Intervention)			Rangareddy (Comparison)			Diff. of change	Barabanki (Intervention)			Unnao (Comparison)			Diff. of change
	BL	EL	Change	BL	EL	Change		BL	EL	Change	BL	EL	Change	
n[1]	*2369*	*2575*		*2476*	*2656*			*2445*	*2410*		*2388*	*2305*		
Receipt of any IFA supplements	40.9	54.5	13.6	74.4	75.8	1.4	**12.2***	62.7	75.6	12.9	56.5	55.4	-1.1	**14.0***
n[2]	*968*	*1403*		*1841*	*2014*			*1534*	*1821*		*1348*	*1278*		
Received 90 + IFA tablets	26.9	26.5	-0.4	28.9	31.5	2.6	**-3.0**	49.8	65.3	15.5	52.7	53.1	0.4	**15.1***
Consumed 90 + IFA tablets	7.5	17.8	10.3	6.3	18.4	12.1	**-1.8**	14.6	36.4	21.8	13.4	18.6	5.2	**16.6***
Consumed all the tablets received	24.7	57.2	32.5	22.5	44.4	21.9	**10.6***	25.3	45.4	20.1	21.5	31.7	10.2	**9.9***

n[1] = *Mothers of 0-23 month olds;* n[2] = Mothers of 0-23 month olds who received any IFA tablets

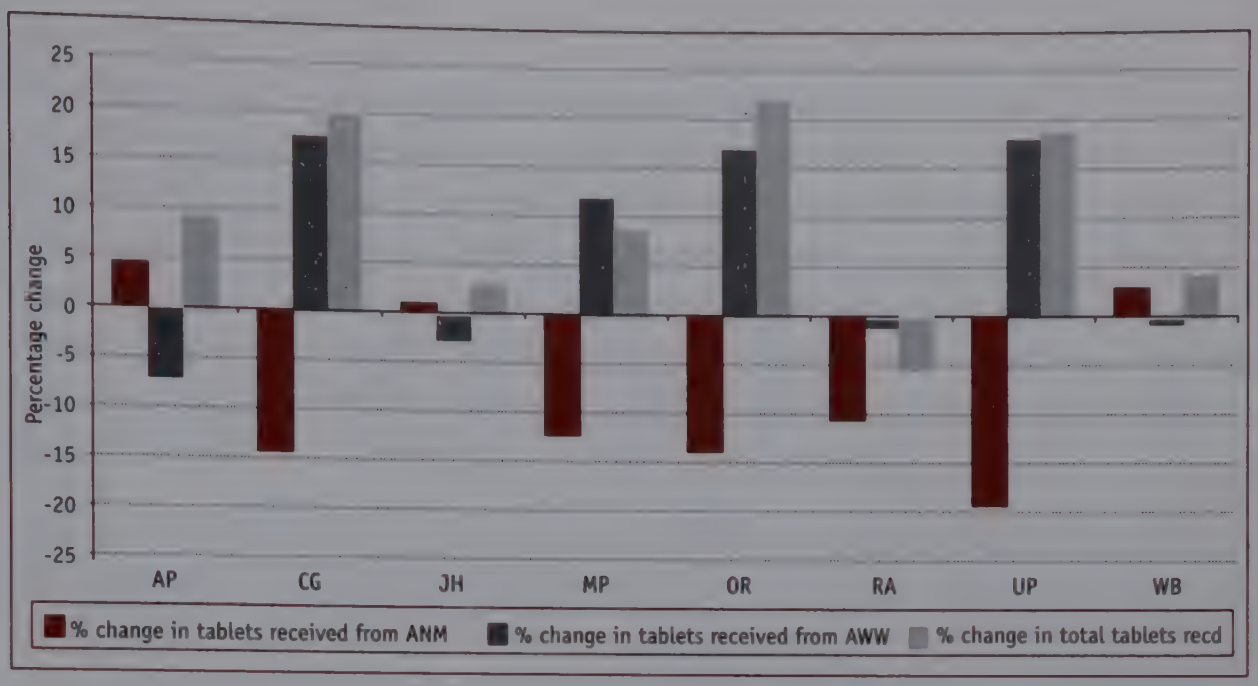
BL = Baseline survey; EL = Endline survey; Change = Change from BL to EL; *Difference significant at 95 percent confidence level

Figure 5.6: **Source of IFA tablets: Shifts in proportion of tablet batches given out by AWW vs ANM over about 12 months, RAPs Rounds 2 and 3. (2004, 2005)**



clearly increased, while that contributed by the ANM decreased. In the remaining four districts, the change was small or absent. When the percentage increments in the proportions of IFA distributed by the AWW and ANM were plotted against the percentage increments in 90+ IFA received (Figure 5.7), a strong association between the increments in IFA and increments in AWW as a source emerged: in every case where AWW became a more frequent source of IFA, receipt of 90+ IFA increased substantially. The Andhra Pradesh district was the only instance where a small increment in ANM as a source was associated with a modest increment in IFA. Two districts that showed no shift in the source of IFA also showed no increment in the receipt of IFA. In the Rajasthan district, the contributions of both ANM and AWW reduced over 12 months, presumably being displaced by other facilities. This was the only instance of an apparent reduction in the receipt of 90+ IFA. Not

Figure 5.7: **Change in receipt of IFA tablets compared to changes in source of receipt of tablets over about 12 months, RAPs Rounds 2 and 3.**



shown in the figures, receipt and consumption of 90+ IFA changed by remarkably similar proportions in all eight districts between these two rounds, and thus associations with consumption also follow the same pattern.

One obvious explanation is that the RACHNA program engaged ICDS more closely than the health program, which was reflected in the AWW becoming more active in contacting women and distributing IFA. Sufficiently purposeful efforts in some districts led to due rewards. The lack of shift (or low intensity of shift) from one source to another probably reflects a lack of intensity of effort to bring about change. Prenatal IFA had been a focus area in INHP-I as well, and was a part of the content of training for every functionary throughout INHP-II, even if at a low key.

Supplies

The source of government supply IFA in most states and districts was the Kit A of the ANM, from which the AWW eventually got her supplies. Throughout most of INHP-II, there were no major disruptions in the supply of Kit A in project districts. Delays were common, and it was estimated that most ANMs received Kit A at intervals of about nine months on an average, instead of the prescribed six months. This delay was not sufficient to cause a shortfall in IFA supplies, because of the relatively poor utilization. Even though coverages of 90+ tablets reached about 70 percent in some states, the coverage of anemic women with a double dose of IFA (180+ tablets) was not seriously attempted in any state: against the expected coverage of 50 percent of all women with 180+ tablets, not even five percent women in any state reported receiving as many. Another indicator of sufficiency of adult IFA tablets is the frequency with which pediatric IFA was supplied to women. This would presumably happen when the service providers fell short of the adult IFA supply. In every survey, women were shown strips of small and large IFA tablets and asked which tablets they had received. Across all surveys, it was very uncommon to come across significant numbers of women reporting that they had received pediatric IFA for their own use. Based on these findings, one estimate put the utilization of IFA tablets at less than 50 percent within the prescribed period of six months in most instances. Exceptions were situations where ANMs covered population sizes far exceeding the norms on which Kit A content was based.

Other factors

As has been described in other papers in this series, one powerful influence was eligibility for food supplements, particularly in the period before the food supplement was made universal. In general, almost every service, whether facility-based or home-based, reached food beneficiaries significantly more often than the others. This included the receipt of IFA tablets, irrespective of whether they were distributed by the AWW or the ANM. One likely explanation is that, in many instances, both the AWW and the ANM operated on the basis of lists of women and children drawn up by the AWW, which was biased in favor of food beneficiaries.

The distance of the home of the woman from the AWC did make a difference to the number of tablets received, but this was small. Socioeconomic status was not a significant factor in most states.

Questions were asked in the RAPs about specific information and advice given by service providers when handing over IFA tablets, and about reasons for not consuming all the tablets given. Over two rounds, about half the districts showed more women saying they had been told to take the tablets before going to bed at night. Fewer districts showed increments in advice regarding dosage. Apart from this, there was little consistent change. The commonest reasons for not consuming all received tablets included a dislike for the taste and forgetting to take the tablets.

Finally, it must be acknowledged that over the years, there has been an increase in the awareness about elements of antenatal care, and IFA is more acceptable to women and communities currently than in the past. INHP has also directly contributed in several ways to this over the years.

The Experience with Pediatric IFA

As mentioned at the outset, pediatric IFA did not receive adequate program emphasis in most districts, and was virtually not a major focus throughout the program by the endline. It was emphasized to a somewhat greater extent in the nutrition evaluation research intervention districts, since pediatric IFA coverage was one of the evaluation parameters. One inherent difficulty with pediatric IFA contributed considerably to this overall lack of emphasis: the only formulation available was a tablet, and while this was possible to administer to slightly older children, the INHP focus age group of under-two children could hardly be expected to consume tablets safely. After waiting for a while in vain for other formulations to be introduced, the program in principle promoted the administration of these tablets by crushing them into a powder and mixing the powder with complementary foods. This was accompanied by detailed rationale about the need for iron at this stage and reassurances that administration of IFA tablets to such young children was indeed a part of national policy, enshrined in the Tenth Plan. The low prevalence of the practice of complementary feeding itself, particularly in the second year of life, was another barrier. Finally, the periodic appearance of reports from intervention studies that raised the possibility of serious adverse effect with iron supplementation of infants and young children further dampened the political will.

Limited evidence is available from INHP surveys to show progress. The project baseline did not include questions on pediatric IFA, nor did the first round of RAPs and two of eight districts in the second round. Results from the second and third rounds of RAPs show that up to about four percent (Rajasthan) to 50 percent (Orissa) of children 12-23 months old ever received pediatric IFA from government sources, but it was not clear whether coverage had improved between rounds. In the Orissa district, for which pediatric IFA data is available only for the last round, almost 60 percent reported receiving at least 50 tablets. Consumption data is not available.

More complete data is available for the two nutrition evaluation research districts, and is presented in Figure 5.8. In both intervention districts, there were significant increments over time, reaching a remarkable 64 percent in the Uttar Pradesh district. The study also reports modest increments in consumption of the tablets.

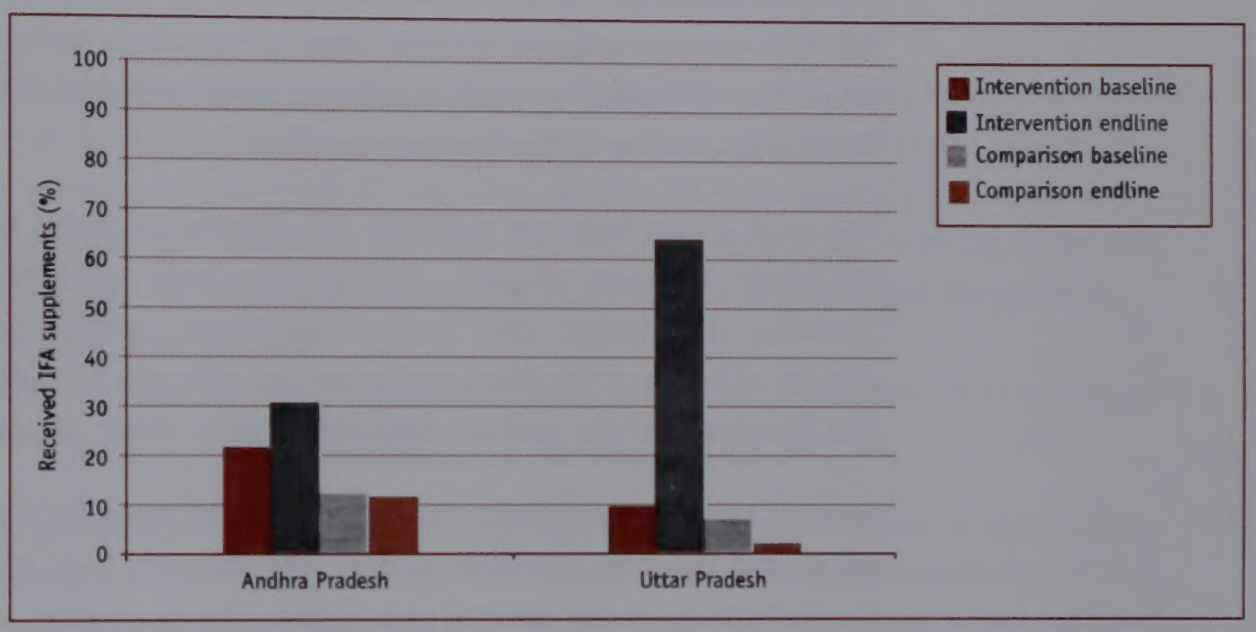


Figure 5.8: **Receipt of Pediatric iron-folic acid (IFA) tablets among children 12-23 months of age, intervention vs comparison areas, Nutrition Evaluation Research Study.**

Conclusions

Despite the somewhat muted priority given to IFA coverage in a program meant primarily to reduce child malnutrition and mortality, the substantial increase in coverage of iron supplements during pregnancy is heartening. The delivery of 90+ IFA tablets during pregnancy has increased about 25 percentage points or more in many states over the life of the project, to reach about half or more women in seven of the eight states. Achieved consumption rates of 90+ IFA tablets as reported by the women are expectedly lower than receipt rates, but by relatively small margins, and percentage point increments in consumption rates are fairly close to percentage point increments in receipts. The factors most likely to have brought about this change, as shown above, include the close and active involvement of the AWW of ICDS, and probably constant reminders from supervisors and during training sessions of the importance to cover all pregnant women with 90-100 tablets and to persuade them to consume these tablets. Increasing levels of general awareness, brought about by similar messages reaching communities through several channels has undoubtedly contributed to improvements.

The few sources of comparable data appear to indicate that improvements in RACHNA-assisted areas are clearly better than in non-assisted areas. Several inputs from RACHNA could have contributed. Antenatal care, including IFA

distribution and consumption, has been a topic that featured prominently in virtually all capacity building activities since much before INHP-II began. During INHP-II, there was special emphasis on taking steps to ensure that no one was left out of services. A number of different ways of achieving this were tried, but perhaps the most widely used method, perhaps because it was the simplest, was the insistence that all pregnant women in the village must find a place in the service register and be tracked over time. In six of eight states, 80 percent or more pregnant women reported receiving at least some government supply IFA, virtually all the time from either the AWW or the ANM. The corresponding NFHS-3 indicator, which includes IFA from other sources, is still estimated to be consistently lower by about 10-30 percentage points in all states other than Rajasthan when compared to estimates from the RACHNA endline survey (comparison not shown in the data above). Field observations suggest that this fundamental process – of attempting to make sure that services registers are used and used properly – is one of the most visible differences between the average RACHNA-assisted and non-assisted areas across all program states. The high proportion of women yet not receiving a single tablet of IFA in Rajasthan and Uttar Pradesh is a matter of continuing concern.

The main lesson from the pediatric IFA experience seems to be that distributing the tablets to young children's families is in itself not difficult – with a little attention, distribution rates can increase. Rather, getting this to become a program priority will pose difficulties until more user-friendly formulations are made available and the extent of the problem becomes a major driver of policy advocacy.

None of this should detract, however, from the need for a more comprehensive policy and program approach to deal with the very high prevalence of anemia and iron deficiency in the general population. The issue goes well beyond the scope of merely strengthening supplementation efforts of health programs in limited age groups: these should be seen at best to be short term contingency efforts until more pervasive and sustainable efforts tackle the roots of the problem.

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increased by 10 percentage points or more in seven out of the eight states. Despite increases in both distribution and consumption of IFA tablets, a gap of about 15-40 percentage points remained between distribution and consumption even at the endline, suggesting that while distribution does drive better consumption rates, other factors continue to influence consumption. Evidence from periodic assessments in selected districts suggests that in districts where the proportion of IFA tablets received by pregnant women from the Anganwadi Workers (AWW) of the ICDS program increased substantially, the distribution and consumption of IFA also increased in proportion. The lack of uniform effect across all districts and states appears to reflect a lack of uniform program effort. For instance, the high proportion of women not receiving a single tablet of IFA in Rajasthan and Uttar Pradesh is matter of continuing concern. The few sources of comparable data appear to indicate that improvements in RACHNA-assisted areas were greater than in non-assisted areas. The factors likely to have contributed to the improved coverage among pregnant women include the active involvement of the AWWs of ICDS, training, and regular reminders from supervisors of the importance to cover all pregnant women.

Data available from the nutrition evaluation research study showed that increments in receipt rates of IFA among children 12-23 months old significantly exceeded rates in non-INHP-assisted areas. All states and districts covered by INHP-II did not focus uniform efforts on improving pediatric IFA coverage, and thus consistent information is not available for this intervention. From field observations, it appears that replacing tablets with a more user-friendly formulation and focusing policy and program attention on anemia in this age group are challenges that urgently need to be addressed.

This series of working papers was envisioned and written by persons actively involved in the program design and implementation. USAID/BASICS directly contributed to the writing and production of this series of papers in several ways before it closed in India in December 2007. A number of data support and field staff gave invaluable contributions, and the papers were reviewed by CARE-India and USAID/India staff.

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CARE-India, August 2008

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About RACHNA

Two major projects of the Reproductive and Child Health, Nutrition and HIV/AIDS (RACHNA) program of CARE-India completed five years of work supported by funds from USAID in late 2006. The second phase of Integrated Nutrition and Health Project (INHP-II) was aimed at helping reduce child malnutrition and mortality. The rural component of the *Chayan* project primarily addressed the unmet need for spacing methods, while its urban component attempted to reduce HIV transmission among at-risk groups. Together, the projects covered 78 districts and 22 cities, spread over 10 states, and worked closely with key national programs and a spectrum of different partners. This series of working papers documents the results and lessons from these five years.

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